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ABSTRACT

A review of the research regarding the effectiveness of cooperative learning methods (particularly student teams) indicated that when the classroom is structured in a way that allows students to work cooperatively on learning tasks, students benefit academically as well as socially. The greatest strength of cooperative learning methods is the wide range of positive outcomes that have been found in the research. Cooperative learning methods are usually inexpensive and easy to implement. Teachers need minimal training to use these techniques. The widespread and growing use of cooperative learning techniques demonstrates that, in addition to their effectiveness, they are practical and attractive to teachers. Among such methods are the Student Team Learning procedure (developed at Johns Hopkins University, Maryland); student teams-achievement divisions; teams-games-tournaments; team-assisted individualization; cooperative integrated reading and composition; jigsaw; learning together; and group investigation. (CB)

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What Research Says to the Teacher

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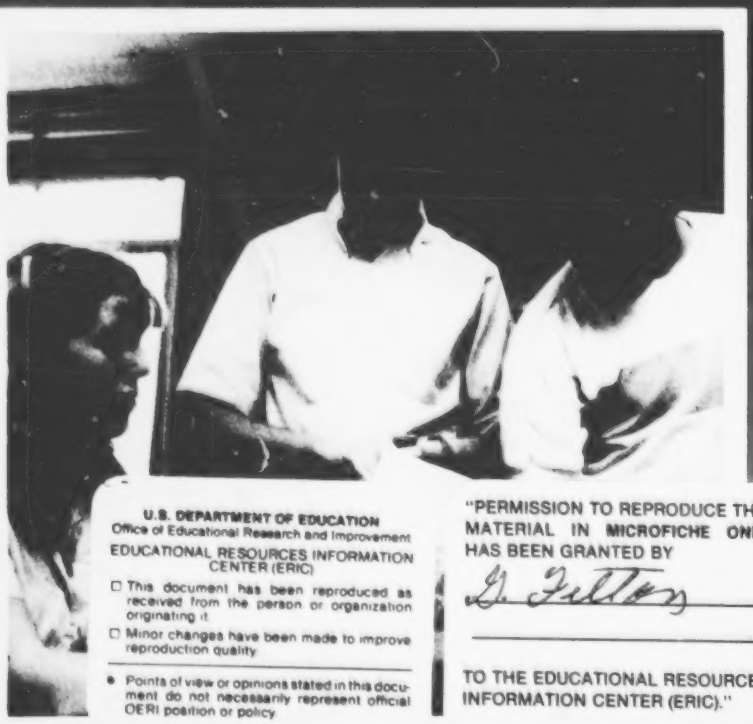
Cooperative Learning:

Student Teams

by Robert E. Slavin



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What Research Says to the Teacher

Cooperative Learning:

Student Teams

SECOND EDITION

by Robert E. Slavin

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Washington, D.C.

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CONTENTS

INTRODUCTION 5

A Day in the Life of Sara Cooper 5
What Is Cooperative Learning? 7
The Background of Cooperative Learning 8

COOPERATIVE LEARNING METHODS 10

Student Team Learning 10
Student Teams-Achievement Divisions (STAD) 11
Teams-Games-Tournament (TGT) 13
Team Assisted Individualization (TAI) 13
Cooperative Integrated Reading and Composition (CIRC) 15

Other Cooperative Learning Methods 16
Jigsaw 16
Learning Together 17
Group Investigation 17

RESEARCH ON COOPERATIVE LEARNING 18

Academic Achievement 18
Intergroup Relations 21
Mainstreaming 23
Self-Esteem 24
Other Outcomes 25

CONCLUSION 26

BIBLIOGRAPHY 28

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INTRODUCTION

A Day in the Life of Sara Cooper

Sara Cooper is an average fifth grader at Hooperville Elementary School. The principal and teachers at Hooperville decided to make cooperative learning the centerpiece of an effort to improve their school. Accordingly, all the teachers are using a variety of Student Team Learning methods. Sara's teacher, Ms. Jackson, has decided to use Student Teams-Achievement Divisions (STAD) to teach spelling, Cooperative Integrated Reading and Composition (CIRC) in reading and writing/language arts, and Team Assisted Individualization (TAI) in mathematics.

Sara is on the same team for all three Student Team Learning methods. The Masterminds has four members: Sara, Luis, John, and Tamika. These students sit as a team, with their desks pulled together, throughout the day.

The first subject today is spelling, a class that uses STAD. Yesterday, Ms. Jackson taught a lesson on forming possessives to the whole class. As the period begins, students in all teams work together to practice the new skill. Ms. Jackson distributes worksheets and worksheet answers to each team and announces that students will have 30 minutes to study before taking a quiz.

The worksheets consist of 30 phrases, such as "the hair of the dog," which students are to restate using possessives (that is, "the dog's hair"). On the Masterminds team, Sara and Luis have decided to work as a pair, while John and Tamika work together.

The first item is "the book of the boy." Luis says, "That's easy. You just put an *apostrophe s* after boy." Sara agrees, and she writes "the boy's book" on the worksheet. Luis checks the answer sheet, which is face down on his desk, and confirms that they are right.

On the next item, "the horns of the cars," Sara and Luis have a problem. Sara starts, "Isn't that just *the car's horns*?"

Luis thinks for a moment. "No, it's more than one car," he says, "It's plural, so you put the apostrophe after the *s*."

"I guess you're right," says Sara. "So it would be *the cars' horns*." Luis writes the answer on the worksheet and Sara checks the answer sheet to confirm that they are right.

The next item stumps both partners: "the toys of the children." Luis suggests that since *children* is plural, they should add *s'* to make *the childrens' toys*, but Sara recalls that Ms. Jackson warned them about plurals that do not end in *s*. They ask John and Tamika for help.

Tamika says, "We just got up to that one ourselves. Ms. Jackson said you add *apostrophe s*."

Luis still thinks he's right. "*Cars'* was plural, so why should *childrens'* be any different?"

"Because the apostrophe always goes right after the main word," John explains. "Then you add an *s* if there isn't already one there. That's why it's got to be *children's*, because the main word is *children*."

"I think you're right," admits Luis.

They check the answer sheet and see that *the children's toys* is correct.

Ms. Jackson, who has been listening in on the team's discussion, comes over to compliment the members on how well they are working together. "You are all doing such a good job of explaining to each other," she says. "If you can keep it up, I'm sure you will be a Superteam in spelling this week!"

At the end of 30 minutes, most of the teams have completed the worksheets and Ms. Jackson asks the students to stop work and move their desks apart. Then she hands out a 10-item quiz, which students take on their own. When everyone has finished, Ms. Jackson has students exchange papers with nonteammates, reads off the answers, and has students mark the papers and return them to their owners.

"Wow!" says Sara after all students have passed their papers to Ms. Jackson for rechecking. "We all got nine or ten right. I'm sure we'll be a Superteam this week!" (Adapted from Slavin [39])*

This hypothetical example of Sara Cooper's spelling class illustrates the main features of cooperative learning in general, and Student Team Learning in particular. A characteristic of all the Student Team Learning methods is that the purpose of the team is to prepare its members for an individual assessment. Sara wants to help her teammates so that they can do well on their individual quizzes, as they want to help her. The camaraderie and team spirit that Sara experiences are also characteristic of all the cooperative learning methods. Without these ingredients, cooperative learning does not work, because if students don't care about their teams or their teammates, they are unlikely to help or encourage one another. Another point that Sara's experience is meant to convey: when students work in small groups, they look forward to class as a social, fun, as well as challenging, learning environment.

This monograph discusses the history and development of cooperative learning techniques. First, it describes the background and classroom applications of the following Student Team Learning methods: Student Teams-Achievement Divisions (STAD), Teams-Games-Tournament (TGT), Team Assisted Individualization (TAI),

*Numbers in parentheses appearing in the text refer to the Bibliography beginning on page 28.

and Cooperative Integrated Reading and Composition (CIRC). It also discusses Jigsaw, Jigsaw II, Learning Together, and Group Investigation. Then it evaluates the research findings on the achievement, attitudes, and behavior of students who have used these methods.

What Is Cooperative Learning?

Cooperation is one of the most important human activities. Elephants have survived as a species because of their size; cheetahs because of their speed; humans because of their ability to cooperate for the good of the group. In modern life, people who can organize as a group to accomplish a common end are likely to be successful—in business, in sports, in the military, or in virtually any endeavor.

One area in which cooperation is not a primary focus is in the classroom, where helping between students may be viewed as cheating. Students are typically in competition with one another for good grades, for teacher approval, and for other rewards. As a result of this competition, students do not encourage and may discourage one another's academic efforts.

To illustrate, think of a typical classroom. The teacher asks Billy to spell "chief." "C-H-E-I-F," he spells. The teacher says, "No. Can anyone help Billy?" Ten hands shoot up, and the teacher chooses Sam, who spells the word correctly.

Does Billy interpret Sam's answer as "help"? Of course not. He is embarrassed by his mistake, and quite possibly angry at Sam for making him look dumb. Sam experiences a momentary feeling of superiority over Billy, which reinforces a pecking order with the most able students at the top and the least able at the bottom. Sam and Billy are unlikely to help each other study their spelling; they are likely to try to discourage each other from studying too hard by expressing a norm that homework is for sissies or nerds.

Imagine that the structure of this classroom has been changed. Billy and Sam and two other students have been asked to work together. Now their goal is to see how many points they can earn together when they take their spelling tests. In this situation, Sam will want to make sure not only that he knows his own spelling words, but also that Billy and his other teammates know theirs. Billy will feel the same responsibility for Sam's learning. Sam and Billy

will want to help each other study and will encourage continued effort.

Such cooperative groups typically have an "all-for-one, one-for-all" attitude in which teammates help and encourage each other, applaud each other's successes, and console each other's setbacks.

This situation is one example of *cooperative learning* (37, 38), a term that refers to instructional methods in which students of all performance levels work together in small groups toward a group goal. The essential feature of cooperative learning is that the success of one student helps other students to be successful. This is just the opposite of the traditional classroom, in which the competition for grades and for other rewards means that one student's success may reduce the chances of another's success.

Of course, cooperative learning methods are not new. Teachers have used them for many years in the form of laboratory groups, project groups, discussion groups, and so on. The recent research on cooperative learning has documented the effects of having students work together, has applied cooperative methods to the teaching of a broader range of skills, and has refined and systematized cooperative strategies to the point where they are now being used extensively in every conceivable subject, from grade two through college level, and in all kinds of schools throughout the world.

The Background of Cooperative Learning

Long before there were practical cooperative learning programs for classrooms, social psychologists studied the general topic of cooperation versus competition extensively. They found that when people work together toward a common goal, several things happen. First, they express norms in support of doing whatever helps the group achieve its goals (51). In the classroom, this means that when students are cooperating toward a group goal, they begin to tell one another that doing school work, coming to class every day, and engaging in other behaviors that help them learn are important and are valued by the peer group. Further, the cooperative group produces more and better ideas than do individuals working alone or competitively. Cooperative discussion of reading passages increases retention of reading content (6), and cooperative discussion improves

problem-solving behavior (16). In short, two (or more) heads are better than one for learning, both because cooperative peers encourage each other and because discussion itself aids learning.

One of the best-established findings concerning cooperation is that when individuals work together toward a group goal, they learn to like one another (7, 9, 12). This should hardly be surprising, as cooperation almost always increases positive, intimate contact between individuals—a condition that leads to the formation of friendships (22). Finally, the research on cooperation consistently reports that people enjoy working together (10, 12, 19).

However, all the studies mentioned took place in social psychological laboratories or in laboratory-like settings. What happens when cooperation is transplanted to the real world of the classroom? The following section provides some answers to this question.

COOPERATIVE LEARNING METHODS

While social psychological research on cooperation dates back to the 1920s, research on specific applications of cooperative learning to the classroom did not begin until the early 1970s. At that time, four independent groups of researchers began to develop and research cooperative learning methods in classroom settings. At present researchers all over the world are studying practical applications of cooperative learning principles, and many cooperative learning methods are available. This monograph focuses on the methods that have been most extensively researched and used in elementary and secondary classrooms.

It should be mentioned that cooperative learning techniques, like any new methods to be introduced in the classroom, will be more effective when teachers and administrators work together to ensure their success.

Student Team Learning

Student Team Learning methods are cooperative learning techniques developed and researched at Johns Hopkins University. More than half of all studies of practical cooperative learning methods involve these techniques.

All cooperative learning methods share the idea that students work together to learn and that they are responsible for one another's learning as well as their own. In addition to the idea of cooperative work, Student Team Learning methods emphasize the use of team goals and team success that can be achieved only if all members learn the objectives being taught. That is, in Student Team Learning the students' tasks are not to *do* but to *learn* something as a team.

Three concepts are central to all Student Team Learning methods: *team rewards, individual accountability, and equal opportunities for success*. Teams using these techniques may earn certificates or other *team rewards* if they achieve above a designated criterion. The teams are not in competition to earn scarce rewards; all (or none) of them may achieve the criterion in a given week. *Individual accountability*

means that team success depends on the individual learning of all members. This concept focuses the activity of the members on tutoring one another and making sure that each person on the team is prepared for a quiz or other assessment that students will take without teammate help. *Equal opportunities for success* means that students contribute to their teams by improving their own past performance. This feature ensures that high, average, and low achievers are equally challenged to do their best, and that the contributions of all team members will be valued.

Research on cooperative learning methods (summarized in pp. 18–25) has indicated that team rewards and individual accountability are essential elements for producing basic skills achievement (37, 38). It is not enough to simply tell students to work together. They must have a reason to take one another's achievement seriously. Further, research indicates that if students are rewarded for doing better than they themselves have done in the past, their motivation to achieve will be greater than it would be if their rewards were based on their performance compared with that of others, because rewards for individual improvement make success neither too difficult nor too easy for students to achieve (36).

Four principal Student Team Learning methods have been extensively developed and researched. Two are general cooperative learning methods adaptable to most subjects and grade levels: Student Teams-Achievement Divisions, or STAD, and Teams-Games-Tournament, or TGT. The remaining two are comprehensive curricula designed for use in particular subjects at particular grade levels: Team Assisted Individualization (TAI) for mathematics in grades 3 through 6, and Cooperative Integrated Reading and Composition (CIRC) for reading and writing instruction in grades 3 through 5. These four methods all incorporate team rewards, individual accountability, and equal opportunities for success, but in different ways.

Student Teams-Achievement Divisions (STAD)

When using STAD (34, 41), students are assigned to four-member learning teams that are mixed in performance level, sex, and ethnicity. After the teacher presents a lesson, students work within their teams to make sure that all members have mastered the

lesson. Finally, all students take individual quizzes on the material, at which time they may not help one another.

Students' quiz scores are compared with their own past averages, and points are awarded based on the degree to which students can meet or exceed their own earlier performance. These points are then totaled to form team scores. Teams that meet certain criteria may earn certificates or other rewards. From teacher presentation to team practice to quiz, the whole cycle of activities usually takes three to five class periods.

Student Teams-Achievement Divisions (STAD) has been used in every imaginable subject, from mathematics to language arts to social studies, and in grade two through college-level classes. It is most appropriate for teaching well-defined objectives with single right answers, such as mathematical computations and applications, language usage and mechanics, geography and map skills, and science facts and concepts.

The main idea behind Student Teams-Achievement Divisions is to motivate students to encourage and help each other to master skills presented by the teacher. If students want their team to earn *team rewards*, they must help their teammates learn the material. They must encourage their teammates to do their best, expressing norms that learning is important, valuable, and fun. After the teacher presents the lesson, students may work in pairs and compare answers, discuss any discrepancies, and help each other with any roadblocks. They may discuss approaches to solving problems, or they may quiz each other on the content they are studying. They teach their teammates and assess their strengths and weaknesses to help them succeed on the quizzes.

Although students study together, they may not help each other with quizzes. Each person must know the material. This *individual accountability* motivates students to do a good job tutoring and explaining to each other, because team success depends on mastery of the required information or skills by all members. Since team scores are based on students' improvement over their own past records (*equal opportunities for success*), all students have the chance to be the team "star" in a given week, either by scoring well above their past record or by producing a perfect paper, which always results in a maximum score regardless of their past averages.

Teams-Games-Tournament (TGT)

Teams-Games-Tournament (8, 41) was the first of the Johns Hopkins cooperative learning methods. Using the same teacher presentations and teamwork as Student Teams-Achievement Divisions, TGT replaces the quizzes with weekly tournaments in which students compete with members of other teams to contribute points to their team scores. The competition takes place at three-person "tournament tables" against others with similar past records in the subject. A "bumping" procedure keeps the competition fair. The winner at each tournament table brings six points to his or her team, regardless of table; this means that low achievers (competing with other low achievers) and high achievers (competing with other high achievers) have *equal opportunities for success*. As in STAD, high-performing teams earn certificates or other forms of *team rewards*.

Teams-Games-Tournament has many of the same dynamics as STAD, with the added dimension of excitement contributed by the use of games. Teammates help one another prepare for the games by studying worksheets and explaining problems. During competitions, however, teammates cannot help each other, thus ensuring *individual accountability*.

Team Assisted Individualization (TAI)

Team Assisted Individualization (47) shares with Student Teams-Achievement Divisions (STAD) and Teams-Games-Tournament (TGT) the use of four-member mixed-ability learning teams and certificates for high-performing teams. Unlike STAD and TGT, however—which use a single pace of instruction for the class—TAI combines cooperative learning with individualized instruction. Also, where STAD and TGT apply to most subjects and grade levels, TAI is specifically designed to teach mathematics to students in grades 3 through 6 (or to older students not ready for a full algebra course).

Students using TAI enter an individualized sequence according to a placement test and then proceed at their own pace. In general, team members work on different units. Teammates check each other's work against answer sheets and help one another with any problems. Then, without help, they take final unit tests that are

scored by student monitors. Each week, the teacher totals the number of units completed by all team members and gives certificates or other *team rewards* to teams that exceed a criterion score based on the number of final tests passed, with extra points for perfect papers and completed homework.

Because students take responsibility for checking each other's work and managing the flow of materials, the teacher can spend most of the class time presenting lessons to small groups of students drawn from the various teams who are working at the same point in the mathematics sequence. For example, the teacher might work with the decimals group, presenting a lesson on decimals, and sending the students back to their teams to work on decimal problems. Then the teacher might work with the fractions group, and so on.

Team Assisted Individualization has many of the motivational dynamics of STAD and TGT. Students encourage and help one another to succeed because they want their teams to succeed. *Individual accountability* is assured because the only score that counts is the final test score, and students take final tests without teammate help. Students have *equal opportunities for success* because all have been placed according to their level of prior knowledge; it is as easy (or difficult) for a low achiever to complete three subtraction units in a week as it is for a higher-achieving classmate to complete three long division units.

However, the individualization feature of Team Assisted Individualization makes it quite different from Student Teams-Achievement Divisions and Teams-Games-Tournament. In mathematics, most concepts build on earlier ones. If the earlier concepts were not mastered, the later ones will be difficult or impossible to learn—a student who cannot subtract or multiply will fail to master long division, a student who does not understand fractional concepts will fail to understand decimals, and so on. Because students using TAI work at their own levels, if they lack prerequisite skills they can build a strong foundation before going on. Also, students who can learn more rapidly need not wait for the rest of the class.

In the past, individualized mathematics instruction has generally failed to increase student mathematics achievement (see Schoen [27]), probably because the teacher's time in earlier models was entirely taken up with checking work and managing materials, leaving little time for teaching students. Students using TAI handle the routine

checking and management, so the teacher can spend most of the class time teaching. This difference, plus the motivation and help provided by students in their cooperative teams, may account for the strong positive effects of TAI on student achievement in contrast to the effects of earlier individualized programs. (Research on TAI is described in the section "Research on Cooperative Learning.")

Unlike STAD and TGT, TAI depends on a specific set of instructional materials. These materials cover concepts from addition to an introduction to algebra. Although designed for use in grades 3 through 6, they have been used for primary instruction in grades 2 through 8 and as remedial instruction in high schools and community colleges. The TAI materials include specific concept lesson guides that suggest methods of introducing mathematical ideas by using demonstrations, manipulatives, and examples. The curricular emphasis is on rapid, firm mastery of algorithms in the context of conceptual understanding and on applications of mathematical ideas to solution of real-life problems.

Cooperative Integrated Reading and Composition (CIRC)

The newest of the Student Team Learning methods is a comprehensive program for teaching reading and writing in the upper elementary grades called Cooperative Integrated Reading and Composition, or CIRC (24). In CIRC, teachers use basal readers and reading groups, much as in traditional reading programs. However, students are assigned to teams composed of pairs of students from two different reading groups. While the teacher is working with one reading group, students in the other groups are working in their pairs on a series of cognitively engaging activities, including reading to one another, making predictions about how narratives will end, summarizing stories to one another, writing responses to questions, and practicing spelling, decoding, and vocabulary. Team members also work to master main idea and other comprehension skills. During language arts periods, students write drafts, revise and edit one another's work, and prepare for "publication" of team books.

In most CIRC activities, students follow a sequence of teacher instruction, team practice, team pre-assessments, and quizzes. That

is, students do not take the quiz until their teammates have determined that they are ready. *Team rewards* are certificates based on the average performance of all members on all reading and writing activities. Because students work on materials appropriate to their reading levels, they have *equal opportunities for success*. Students' contributions to their teams are based on their quiz scores and final independently written compositions, thus ensuring *individual accountability*.

Other Cooperative Learning Methods

Jigsaw

Jigsaw was originally designed by Elliot Aronson and his colleagues (2). In Aronson's Jigsaw method, students are assigned to six-member teams to work on academic material that has been broken down into sections. For example, a biography might be divided into early life, first accomplishments, major setbacks, later life, and impact on history. Each team member reads his or her section. Next, members of different teams who have studied the same sections meet in "expert groups" to discuss their sections. Then the students return to their teams and take turns teaching their teammates about their sections. Since the only way students can learn about other sections than their own is to listen carefully to their teammates, they are motivated to support and show interest in one another's work.

The author developed a modification of Jigsaw at Johns Hopkins University and then incorporated it in the Student Team Learning Program (41). Students using this method, called Jigsaw II, work in four- or five-member teams as in Teams-Games-Tournament (TGT) and Student Teams-Achievement Divisions (STAD). Instead of being assigned unique sections, all students read a common narrative, such as a book chapter, a short story, or a biography. However, each student also receives a topic on which to become an expert. Those with the same topics meet in expert groups to discuss them, after which they return to their teams to teach what they have learned to their teammates. Then students take individual quizzes, which result in team scores based on the improvement score system of STAD. Teams that meet preset standards may earn certificates.

Learning Together

David and Roger Johnson at the University of Minnesota developed the Learning Together model of cooperative learning (17). Students using this method work in four- or five-member heterogeneous groups on assignment sheets. Each group hands in a single sheet, and receives praise and rewards based on the group product.

Group Investigation

Developed by Shlomo Sharan at the University of Tel Aviv (29), Group Investigation is a general classroom organization plan in which students work in small groups using cooperative inquiry, group discussion, and cooperative planning and projects. Students form their own two- to six-member groups. After choosing subtopics from a unit being studied by the entire class, the groups further break their subtopics into individual tasks and carry out the activities necessary to prepare group reports. Each group then makes a presentation or display to communicate its findings to the entire class.

RESEARCH ON COOPERATIVE LEARNING

Cooperative learning methods are among the most extensively evaluated alternatives to traditional instruction in use in schools today. More than 70 high-quality studies have evaluated various cooperative learning methods over periods of at least four weeks in regular elementary and secondary schools; 63 of these have measured effects on student achievement. All these studies compared the effects of cooperative learning with those of traditionally taught control groups on measures of the same objectives pursued in all classes. Teachers and classes were either randomly assigned to cooperative or control conditions, or they were matched on pretest achievement level and other factors.

Academic Achievement

Overall, of 63 studies of the achievement effects of cooperative learning, 36 (57 percent) have found significantly greater achievement in cooperative than in control classes. Twenty-six (41 percent) found no differences, and in only one study did a control group outperform the experimental group. However, the effects of cooperative learning vary considerably according to the particular methods used. As noted earlier, two elements must be present if cooperative learning is to be effective: *group goals* and *individual accountability* (37, 38, 42). That is, groups must be working to achieve some goal or earn rewards or recognition, and the success of the group must depend on the individual learning of every group member. In studies of methods of this kind (for example, Student Teams-Achievement Divisions, Teams-Games-Tournament, Team Assisted Individualization, Cooperative Integrated Reading and Composition), effects on achievement have been consistently positive; 34 out of 41 such studies (83 percent) found significantly positive achievement effects. In contrast, only 4 of 22 studies (18 percent) lacking group goals and individual accountability found positive effects on student achievement. Two of these positive effects were found in a study that compared four cooperative learning methods with a competitive

control group in Nigerian junior high science classes (26). This study found greater learning in Learning Together and Jigsaw classes (cooperative learning methods lacking group goals and individual accountability) than in competitive control classes, but the STAD and TGT classes learned considerably more than did the other cooperative methods (or the control method). The other two successful studies of cooperative learning methods lacking group goals evaluated Group Investigation in Israel (28, 31). In Group Investigation, students in each group are responsible for one unique part of the group's overall task, ensuring individual accountability. Then, the group's overall performance is evaluated. Even though there are no specific group rewards (as are used in STAD, TGT, TAI, and CIRC), the group evaluation probably serves the same purpose.

Why are group goals and individual accountability so important? To understand this, consider the alternatives. In many forms of cooperative learning, students work together to complete a single worksheet or to solve one problem together. In such methods, there is little reason for more able students to take time to explain what is going on to their less able groupmates or to ask their opinions. When the group task is to *do* something, rather than to *learn* something, the participation of less able students may be seen as interference rather than help.

In contrast, when the group's task is to ensure that every group member has *learned* something, it is in the interest of every member to spend time explaining concepts to other members. Research on students' behaviors within cooperative groups has consistently found that the students who gain most from cooperative work are those who give and receive elaborated explanations (52). What group goals and individual accountability do is to motivate students to give such explanations, to take one another's achievement seriously.

Cooperative learning rarely has negative effects on student achievement, so teachers can reap the social benefits of cooperation by simply allowing students to work together or by giving them problems to solve as a group. However, if teachers wish to use cooperative methods to accelerate student achievement, the research evidence is clear that they must set up the cooperative activity so that their groups are rewarded (for example, with certificates, recognition, a small part of their grades) based on the individual achievement of every group member. Usually this means that students study

together in their groups and then have their scores on individual quizzes averaged to form a team score.

Do cooperative learning methods work equally well for all types of students? In general, the answer is yes. While occasional studies find particular advantages for high or low achievers, boys or girls, and so on, the great majority find equal benefits for all types of students. Sometimes a concern is expressed that cooperative learning will hold back high achievers. The research provides absolutely no support for this claim; high achievers gain from cooperative learning (relative to high achievers in traditional classes) just as much as do low and average achievers (38).

One exception to the pattern of equal effects for all types of students is that cooperative learning seems to have particularly strong effects for Black and Hispanic students, regardless of their achievement level (21, 39, 49). If this effect maintains in future studies, it may be explained by the fact that Black and Hispanic students tend to particularly prefer cooperation and working together. The evidence on this point, however, is not entirely consistent. Therefore, at this time the idea that cooperative learning is especially effective with minority students must be considered only a possibility.

Among the cooperative learning methods, the Student Team Learning programs have been most extensively researched and most often found to be instructionally effective. Of 14 studies of Student Teams-Achievement Divisions (STAD) and closely related methods, 11 found significantly higher achievement for this method than for traditional instruction, and two found no differences. For example, Slavin and Karweit (44) evaluated STAD over an entire school year in inner-city Philadelphia ninth grade mathematics classes. Student performance on a standardized mathematics test increased significantly more than in either a mastery learning group or a control group using the same materials. Substantial differences favoring STAD have been found in such diverse subjects as social studies (1), language arts (43), mathematics (32), and science (26). Nine of 11 studies of Teams-Games-Tournament (TGT) found similar results (8).

The greatest effects of Student Team Learning methods have been found in studies of Team Assisted Individualization (TAI). Five of six studies found substantially greater learning of mathematics computations in TAI than in control classes, while one study found no

differences (see Slavin [40]). Across all six studies, the TAI classes gained an average of twice as many grade equivalents or standardized mathematics computation measures as traditionally taught control classes. For example, in one 18-week study in Wilmington, Delaware (45), the control group gained .61 grade equivalents in mathematics computations, while the TAI classes gained 1.65 grade equivalents. These experimental-control differences were still substantial (though smaller) a year after the students were in TAI. In mathematics concepts and applications, one of three studies (48), found significantly greater gains in TAI than in control methods, while two found no significant differences (45).

Two studies of Cooperative Integrated Reading and Composition (CIRC) found substantial positive effects of this method on standardized tests of reading comprehension, reading vocabulary, language expression, language mechanics, and spelling in comparison with traditional control groups (50). The CIRC classes gained 30 to 70 percent of a grade equivalent more than control classes on these measures in both studies. Significantly greater achievement on writing samples was also found favoring the CIRC students in both studies.

Outside of the Student Team Learning methods, the most consistently successful model for increasing student achievement is Group Investigation (29). One study of this method (31) found that it increased learning of English as a foreign language, while Sharan and Shachar (28) found positive effects of Group Investigation on learning of history and geography. A third study of only three weeks' duration (30) also found positive effects on social studies achievement, particularly on higher-level concepts. The Learning Together methods (17) have been found to be instructionally effective when they assign group grades based on the average of group members' individual quiz scores (14, 54). In these studies, however, the control groups receive no instruction; students in these "individualistic" conditions worked by themselves on worksheets with only occasional help from the teacher.

Intergroup Relations

As noted previously, one of the earliest and strongest findings in the laboratory research on cooperation was that people who cooperate

learn to like one another (7, 9, 12). Not surprisingly, the cooperative learning classroom studies have found quite consistently that students express greater liking for their classmates in general as a result of participating in a cooperative learning method (see Slavin [37]). This is important in itself. Liking among students is especially important, however, when students have different ethnic backgrounds. Anyone who has spent much time in a desegregated junior or senior high school knows that white students associate mostly with white students, Black students with Black students, Hispanics with Hispanics, and so on. Such an observation is always a blow to those who have hoped that desegregation by itself would lead to increased contact and improved relations among students of different ethnic groups. Further, there is substantial evidence that, left alone, ethnic separateness in schools does not naturally diminish over time (11).

Social scientists have long advocated interethnic cooperation as a means of ensuring positive intergroup relations in desegregated settings. The famous Social Science Statement submitted as part of the Brown v. Board of Education school desegregation decision strongly emphasized that positive intergroup relations would rise from school desegregation if and only if students were involved in cooperative, equal-status interaction sanctioned by the school (see Slavin [39]).

The research on cooperative learning methods has borne out the expectations of the social scientists who participated in the Brown v. Board of Education statement. Cooperative learning methods embody the requirements of cooperative, equal-status interaction between students of different ethnic backgrounds sanctioned by the school (39). In most of the research on intergroup relations, students were asked to list their best friends at the beginning of the study and again at the end. The number of friendship choices students made outside their own ethnic groups was the measure of intergroup relations. Positive effects on intergroup relations have been found for Student Teams-Achievement Divisions (STAD), Teams-Games-Tournament (TGT), Team Assisted Individualization (TAI), Jigsaw, Learning Together, and Group Investigation modes (40).

Two of these studies, one on STAD (35), and one on Jigsaw II (55), included followups of intergroup friendships several months after the end of the studies. Both found that students who had been in cooperative learning classes still named significantly more friends

outside their own ethnic groups than did those who had been in control classes. Two studies of Group Investigation (28, 31) found that students' improved attitudes and behaviors toward classmates of different ethnic backgrounds extended to classmates who had never been in the same groups, and a study of TAI (25) found positive effects of this method on cross-ethnic interactions outside as well as in class.

As is the case for achievement, the effects of cooperative learning on intergroup relations apply across kinds of schools, subjects, student ages, and other dimensions. The STAD, TGT, and TAI studies took place in east coast urban and suburban schools in which the principal ethnic groups were Blacks and whites. The studies of Cooper and others (5) and Johnson and Johnson (18) also involved primarily Black and white students. The Jigsaw studies and the Weigel, Wiser, and Cook (53) study, however, took place in western urban and rural schools with Mexican-American, Black, and Anglo students, while the Ziegler (55) Jigsaw II study took place in Toronto, where the major ethnic groups were Anglo-Canadians and children of recent European immigrants. The Sharan (28, 31) studies of Group Investigation took place in Israel and involved friendships between Jews of European and Middle-Eastern backgrounds. Regardless of the ethnicities involved, the cooperative learning strategies apparently make it possible for students to see one another in a positive light and to form friendships based on human qualities rather than on skin colors or accents.

Mainstreaming

Although ethnicity is a major barrier to friendship, it is not so large as the one between physically or mentally handicapped children and their normal-progress peers. The mandate of Public Law 94-142 to place as many children as possible in regular classrooms has created an unprecedented opportunity for handicapped children to take their place in the mainstream of society. It has also created enormous practical problems for classroom teachers, however, and it often leads to social rejection of the handicapped children. Because cooperative learning methods have been successful in improving relationships across the ethnicity barrier—which somewhat resembles

the barrier between mainstreamed and normal-progress students—these methods have also been applied to increase the acceptance of the mainstreamed student.

The research on cooperative learning and mainstreaming has focused on the academically handicapped child. In one study, Student Teams-Achievement Divisions (STAD) was used to attempt to integrate students performing two years or more below the level of their peers into the social structure of the classroom. Its use significantly reduced the degree to which the normal-progress students rejected their mainstreamed classmates and increased the academic achievement and self-esteem of all students (23). Similar effects have been found for Team Assisted Individualization (TAI) (48), and other research using cooperative teams has also shown significant improvements in relationships between mainstreamed academically handicapped students and their normal-progress peers (3, 5). In addition, one study in a self-contained school for emotionally disturbed adolescents found that the use of Teams-Games-Tournament (TGT) increased positive interactions and friendships among students (33). Five months after the study ended, these positive interactions were still found more often in the former TGT classes than in the control classes. In a study in a similar setting, Janke found that the emotionally disturbed students were more on task, better behaved, and had better attendance in TGT classes than in control classes (15).

Perhaps the most important fact about cooperative learning methods in the mainstreamed classroom is that these techniques are not only good for the handicapped children, but they are among the few methods for helping these students that also have a clear benefit for all children in terms of academic achievement.

Self-Esteem

One of the most important aspects of a child's personality is his or her self-esteem. Many people have assumed that self-esteem is a relatively stable personal attribute that schools have little ability to change. Several researchers working on cooperative learning techniques have found, however, that teams do increase students' self-esteem. Students in cooperative learning classes have been found to

have more positive feelings about themselves than do those in traditional classes. These improvements in self-esteem have been found for TGT and STAD (37), for Jigsaw (4), and for the three methods combined (43). Improvements in student self-concepts have also been found for TAI (46). Why does this occur? First, it has been consistently found that TGT and STAD students report that they like others and feel liked by others more than control students do (37). The liking of others and feeling liked by them are obvious components of feeling worthwhile. Second, it seems probable that students feel (and are) more successful in their school work when they work in teams than when they work independently. This can also lead to an increase in self-esteem. Whatever the reason, the effects of cooperative learning methods on self-esteem may be particularly important for their long-term effects on mental health. A student who has had a cooperative, mutually supportive experience in school may be less likely to be antisocial, withdrawn, or depressed in later life. In fact, a remarkable study in the Kansas City (Missouri) schools found that lower socioeconomic-status students at risk of becoming delinquent who worked in cooperative groups in sixth grade had better attendance, fewer contacts with the police, and higher behavioral ratings by teachers in seventh through eleventh grades than did control students (13).

Other Outcomes

In addition to effects on achievement, positive intergroup relations, greater acceptance of mainstreamed students, and self-esteem, cooperative learning has been found to affect a variety of other important educational outcomes. These include liking of school, development of peer norms in favor of doing well academically, feelings of individual control over the student's own fate in school, and cooperativeness and altruism (see Slavin [37]). Teams-Games-Tournament (8) and Student Teams-Achievement Divisions (15, 34) have been found to have positive effects on students' time on task.

CONCLUSION

The positive effects of cooperative learning methods on a variety of student outcomes are not found in every study or for every method. The overall conclusion to be drawn from this research, however, is that when the classroom is structured in a way that allows students to work cooperatively on learning tasks, students benefit academically as well as socially. The greatest strength of cooperative learning methods is the wide range of positive outcomes that has been found for them in the research. Although there may be many ways to improve relationships between students of different ethnic backgrounds or between mainstreamed and normal-progress students, few can also help to improve student achievement. And although there may be many ways to accelerate student learning in one or more subjects or grade levels, few apply equally well in almost all subjects and grade levels; even fewer can document improvements in learning and also show improvements in students' social relationships, self-esteem, liking of school, and other outcomes.

Additional features of all the cooperative learning methods are their inexpensiveness and their ease of use. In their simplest form, all these methods require is that the teacher assign students to small teams, give them material to study together, assess student learning, and give the teams some kind of recognition or reward based on the average of the team members' scores. Teachers need minimal training to use these techniques. Detailed teacher's manuals are available for TGT, STAD, and Jigsaw II (41), TAI (47), and CIRC (24). Books describing the original Jigsaw (2), the Learning Together model (17), and Group Investigation (29) are also available. Hundreds of teachers have successfully used these methods, especially STAD and TGT, with nothing more than the manuals or books, and hundreds more have done so after a one-day workshop. Once teachers know how to use them, the methods require little or no additional preparation time.

Because of their effectiveness, their practicality, and perhaps most importantly, the fact that teachers and students simply enjoy using them, cooperative learning methods are being used more and more widely throughout the United States and several foreign countries.

More than 5,000 schools are using the Student Team Learning methods from Johns Hopkins University, and that number is constantly growing.

In summary, the research on cooperative learning methods supports the usefulness of these strategies for improving such diverse outcomes as student achievement at a variety of grade levels and in many subjects, intergroup relations, relationships between mainstreamed and normal-progress students, and student self-esteem. Their widespread and growing use demonstrates that in addition to their effectiveness, cooperative learning methods are practical and attractive to teachers. The history of the development, evaluation, and dissemination of cooperative learning is an outstanding example of educational research resulting in directly useful programs that have improved the educational experience of thousands of students and will continue to affect thousands more.

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